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BRUSH REFORMING APPARATUS FOR TOOTHBRUSH

FIELD OF THE INVENTION

This invention relates to a brush reforming apparatus for a toothbrush, which reforms a deformed brush portion of a toothbrush having been used numerous times.

BACKGROUND OF THE INVENTION

Using a toothbrush for numerous times causes plastic deformation of a brush portion, and not only will teeth be prevented from being effectively brushed, but in some cases may even effect one's gum when the brush portion is deformed to a point unbearable for use. Accordingly, the user purchases a new toothbrush whenever necessary. However, the bristles comprising a brush portion of a toothbrush are mostly molded with synthetic resin. Therefore, it is known that a plastic deformed brush portion can be reformed by heating the brush portion with boiled water (or hot water having a relatively high temperature), and then cooling the brush portion with cold water, in a case when the brush portion is formed from synthetic resin.

An apparatus, which has a spring member binding substantially the entire body of a brush portion from the distal end of a toothbrush, and a fixing member for fixing the spring member with the distal end of the brush portion, can be given as a conventional example of an apparatus for reforming a brush portion of a toothbrush, as shown in Japanese Utility Model Publication Nos. Sho58-152136, Sho59-38833, and Hei7-3361. Another apparatus, which has a reforming apparatus body for binding substantially the entire body of a brush portion from the distal end of a toothbrush, and an openable operating means being integrally formed to the reforming apparatus body, is also shown in Japanese Patent Publication No. Hei7-289356. Accordingly, in each of the foregoing conventional reforming apparatuses, a brush portion of a toothbrush is bound by the spring member or the reforming apparatus body, the brush portion is then applied with boiled water or steeped into hot water, and the brush portion is then cooled with cold water, thereby, the brush portion of the toothbrush is reformed back to a state similar to a state prior of its use.

Toothbrushes, meanwhile, exist in a vast variety of shapes and sizes, and various toothbrushes have been developed with consideration of usage by adults and children, different preferences of use, different brushing performance, etc. More particularly, the use of electric toothbrushes has spread in recent years.

Nevertheless, according to each of the above-described conventional reforming apparatuses (brush reforming apparatuses for a toothbrush), since the spring member or the reforming apparatus body for binding the brush portion of the toothbrush are formed in a single predetermined shape, the spring member or the reforming apparatus body requires preparation of a reform apparatus for each

corresponding toothbrush in order to be used upon various brush portions of toothbrushes. That is, a vast variety of reforming apparatuses corresponding to every each shape of a toothbrush, size or length of a brush portion are required to be manufactured. Consequently, an increase in manufacturing cost is unavoidable, and a vast variety of reforming apparatuses are required to be purchased even for an average family of 3 or 4 members.

Therefore, it is an object of this invention to solve the foregoing problems by providing a brush reforming apparatus for a toothbrush, which is able to reform in correspondence with the sizes of the brush portions for a vast variety of toothbrushes at an inexpensive manufacture cost.

SUMMARY OF THE INVENTION

The first invention of this application (invention described in claim 1) is a brush reforming apparatus for a toothbrush comprising: a toothbrush supporting body having; a supporting portion supporting at least a bottom surface of a distal end of a toothbrush; and one or two guiding groove portion(s) or one or two guiding elongated slot(s) being formed above the distal end of the toothbrush supported by the supporting portion; and a binding body having a belt-like shape, the binding body being inserted through the one or two guiding groove portion(s) or the one or two guiding elongated slot(s), and the binding body being bent at a center of the binding body into a U letter, a V letter, or a rectangular C letter shape. According to the first invention, a distal end of a toothbrush is supported by a supporting portion formed to a toothbrush supporting body, and a binding body is moved in a direction toward the distal end of the toothbrush or in a direction opposite from the distal end of the toothbrush, thereby, a brush portion of a toothbrush is bound by the binding body. Accordingly, the first invention can bind a brush with extreme ease and quickness, and provide binding whether a brush portion of a toothbrush is long or short. In a state where a brush is bound by the toothbrush reforming apparatus, a method, for example, in which the toothbrush reforming apparatus is applied with boiled water or steeped into hot water, and then cooled by cold water or the like, allows the brush to be reformed into an ideal state.

The second invention (invention described in claim 2) is a brush reforming apparatus for a toothbrush comprising: a toothbrush supporting body having; one supporting portion supporting at least a bottom surface of a distal end of a toothbrush; other supporting portion being formed opposite to a position where the one supporting portion is formed, the other supporting portion supporting at least the bottom surface of the distal end of the toothbrush, and the other supporting portion supporting from at a position above or below a supporting position of the one supporting portion; and one or two guiding groove portion(s) or one or two guiding elongated slot(s) being formed between the one supporting portion and the other supporting portion, and being formed above the distal end of the toothbrush supported by the one supporting portion or the other supporting portion; and an endless binding member having a belt-like shape and being inserted through the one or two guiding groove portion(s) or the one or two guiding elongated slot(s). According to the second invention, a toothbrush supporting body is

brush supporting body from a rear side. FIG.7 is a view showing a method of using the toothbrush reforming apparatus shown in FIG.5, in which (A) is a perspective view showing a brush portion of a toothbrush inserted into a binding body, (B) is a right side view showing a state prior to moving of a toothbrush supporting body, and (C) is a perspective view showing a state after a binding body has been drawn subsequent to the moving of the toothbrush supporting body. FIG.8 is a perspective view showing a toothbrush reforming apparatus of the third embodiment. FIG.9 is a rear view of the toothbrush reforming apparatus shown in FIG.8. FIG.10 is a perspective view of the toothbrush reforming apparatus of the fourth embodiment. FIG.11 is a perspective view showing a support position-adjusting member. FIG.12 is a perspective view showing a binding body supporting member and a binding body. FIG.13 is a view showing a toothbrush reforming apparatus of the fifth embodiment and a varied example thereof, in which (A) is an exploded perspective view of the toothbrush reforming apparatus of the fifth embodiment, (B) is a right side view showing an attached state of a support position-adjusting member, (C) is a right side view showing another toothbrush reforming apparatus attached with a support position-adjusting member shown in (A). FIG.14 is a perspective view showing a toothbrush reforming apparatus of the sixth embodiment. FIG.15 is a cross-sectional view along line A-A. FIG.16 is a cross-sectional view showing a varied example of the toothbrush reforming apparatus shown in FIG.14. FIG.17 is a perspective view showing a toothbrush reforming apparatus of the seventh embodiment. FIG.18 is a cross-sectional view of a binding body. FIG.19 is a perspective view showing a moving member. FIG.20 is a perspective view showing a toothbrush reforming apparatus of the eighth embodiment. FIG.21 is a front view of the toothbrush reforming apparatus shown in FIG.20. FIG.22 is a rear view of the toothbrush reforming apparatus shown in FIG.20. FIG.23 is a perspective view showing a moving member. FIG.24 is a perspective view showing a method of using the toothbrush reforming apparatus shown in FIG.20. FIG.25 is a perspective view showing a toothbrush reforming apparatus of the ninth embodiment. FIG.26 is a perspective view showing a state prior to the use of the toothbrush reforming apparatus shown in FIG.25. FIG.27 is a perspective view of a toothbrush reforming apparatus of the tenth embodiment. FIG.28 is an exploded perspective view of a toothbrush supporting body comprising the toothbrush reforming apparatus shown in FIG.27.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Plural embodiments regarding this invention will hereinafter be explained with reference to the drawings. The first embodiment of a brush reforming apparatus 1 for a toothbrush will first be explained.

The brush reforming apparatus for a toothbrush 1 is comprised of a toothbrush supporting body 2 and a binding body 3, as shown in FIG.1. The toothbrush supporting body 2 is integrally molded with synthetic resin, wood, hard-rubber or metal, and has a supporting portion 2a whose top surface serves as a

supporting face for supporting the bottom surface of a brush portion B of a toothbrush T, and a left erect portion 2b and a right erect portion 2c erected on both left and right side of the supporting portion 2a. That is, in the brush reforming apparatus 1 of the first embodiment, the supporting portion 2a, the left erect portion 2b and the right erect portion 2c form an insertion space for inserting the brush portion B formed on a distal end of the toothbrush T, as shown in FIG.2. A binding body supporting portion 2d having a plane shape formed as a rectangular C letter shape is formed on an upper portion of the brush reforming apparatus 1; a left guiding elongated slot 2e is formed on a left side of an upper portion of a distal end of an inserted brush portion B; and a right guiding elongated slot 2f is formed on a right side of the upper portion of a distal end of an inserted brush portion B. The binding body supporting portion 2d has a left guiding groove portion 2g formed at an inner side thereof in front of the left guiding elongated slot 2e, and a right guiding groove portion 2h formed at an inner side thereof in front of the right guiding elongated slot 2f. It is now to be noted that the left guiding elongated slot 2e and the right guiding elongated slot 2f are inclined toward each other to form a separated upside down V letter-like shape, and that the left guiding groove portion 2g and the right guiding groove portion 2h also form a separated upside down V letter-like shape in correspondence to the left guiding elongated slot 2e and the right guiding elongated slot 2f.

Further, in the brush reforming apparatus 1, the binding body 3 having a belt-like form is inserted through the left guiding elongated slot 2e, the left guiding groove portion 2g, the right guiding elongated slot 2f and the right guiding groove portion 2h. The binding body 3 is molded into a belt-like form with synthetic resin, wood, hard rubber or metal; both ends of the binding body 3 are secured to each other with a ring-like metal fitting 4; an arc-like portion 3a with a bent arc-like shape is formed on an opposite side of the metal fitting 4; and a pressing portion 3b for pressing an upper surface of the toothbrush T with a finger when operating the binding portion 3 is formed at a bottom end of the arc portion 3a.

According to the brush reforming apparatus 1 of the first embodiment, in a state where the binding body 3 is projected toward the front side as shown in FIG.3, the brush portion B of the toothbrush T is inserted through the binding body 3, and the binding body 3 having the brush portion B inserted therethrough is then either inserted into the insertion space in a manner placed upon the supporting portion 2a of the supporting portion 2a, or has one end thereof pulled in a direction toward the distal end of the brush B by being guided by the left guiding elongated slot 2e along with the left guiding groove portion 2g and the right guiding elongated slot 2f along with the right guiding groove portion 2h, thereby, the brush B1 of the brush portion B is bound at the other end of the binding body 3.

Accordingly, in such state, a plastic deformed brush B1 is steeped into boiled water or relatively hot water and is then cooled (or returned to normal temperature) with cold water to be reformed into a state similar to an original state thereof.

Consequently, with the brush reforming apparatus 1 of the first embodiment, the brush B1 of

the brush portion B of the toothbrush T can be bound easily by operating the binding body 3 in the above-described manner. More particularly, according to the brush reforming apparatus 1, the binding body 3 can securely bind the brush B1 whether the length of the brush portion B1 is long or short owing to the belt-like structure thereof.

Next, a second embodiment of a brush reforming apparatus 10 for a toothbrush will be explained in detail with reference to the drawings. The brush reforming apparatus 10 is comprised of a toothbrush supporting body 11 and the binding body 3, as shown in FIG.5. Unlike the brush reforming apparatus 10 of the first embodiment, the brush reforming apparatus 10 has a characteristic of not having a left erect portion 2b and a right erect portion 2c. That is, the toothbrush supporting body 11 is comprised of a supporting portion 11a for supporting the brush portion B of the toothbrush T, a rear side erect portion 11b being erect upward from a rear side of the supporting portion 11a, and a binding body supporting portion 11c formed at a top end of the rear side erect portion 11b. The binding body supporting portion 11c is formed of a left elongated slot 11d and a right elongated slot 11e for guiding an insertion of the binding body 3, a left guiding groove portion 11f, and a right guiding groove portion 11g, as shown in FIG.6. It is now to be noted that the description of the binding body 3 shall be omitted since the binding body 3 has the same structure as that of the binding body 3 of the first embodiment.

The brush reforming apparatus 10 of the second embodiment, the brush portion B of the toothbrush T is inserted into the binding body 3 from below in a state where the binding body 3 is pulled toward the front as shown in FIG.7 (A), and the brush B1 is then positioned inside the binding body 1, and then either the toothbrush supporting body 11 is moved in an arrow direction or the binding body 3 is moved in an opposite direction of the arrow as shown in FIG.7 (B). Subsequently, the binding body 3 is pulled in an arrow direction as shown in FIG.7 (C). With such operation, the binding body 3 and the toothbrush supporting body 11 can easily bind the plastic deformed brush B1. More particularly, the brush reforming apparatus 10 of the second embodiment, unlike the brush reforming apparatus 1 of the first embodiment, is formed without the left erect portion 2b or the right erect portion 2c, and the supporting portion 11a thereof is open on both sides; therefore, the brush reforming apparatus 10 can securely bind the brush even when the brush portion of the toothbrush is wider than the supporting portion 11a.

Next, a third embodiment of a brush reforming apparatus 20 for a toothbrush will be explained in detail with reference to the drawings. The brush reforming apparatus 20 is comprised of a toothbrush supporting body 21 and a belt-like binding body 22, as shown in FIG.8. The toothbrush supporting body 21 is comprised of a supporting member 23 formed with integrally molded synthetic resin, wood, hard rubber, or metal, and a binding body supporting member 24 coupled to the supporting member 23. The supporting member 23 has a supporting portion 23a for supporting a brush portion of a toothbrush, a left erect portion 23b erected upward from a left end of the supporting portion 23, and a right erect portion 23c erected upward from a right end of the supporting portion 23a. A left protrusion portion 23d is

formed at an inner side of an top end of the left erect portion 23b and a right protrusion portion 23c is formed at an inner side of an top end of the right erect portion 23c, as shown in FIG.9.

The binding body supporting member 24 has a plane shape thereof molded into a substantially rectangular C letter shape as shown in FIG.8, and is comprised of a left opposing portion 24a opposing the left erect portion 23b formed in the supporting member 23, a right opposing portion 24b opposing the right erect portion 23c, a rear side portion 24c coupled to the left opposing portion 24a on one side and coupled to the right opposing portion 24b on the other side. As shown in FIG.9, three guide rails 24d, 24e, 24f, which allow the left protrusion portion 23d to be selectively inserted therethrough, are formed at an outer side of the left opposing portion 24a, and three guide rails 24g, 24h, 24i, which allow the right protrusion portion 24d to be selectively inserted therethrough, are formed at an outer side of the right opposing portion 24b. As shown in FIG.9, a left guiding elongated slot 24j for insertion of a binding body 22 is formed at a left side of the rear side portion 24c of the binding body supporting member 24, and a right guiding elongated slot 24k for insertion of the binding body 22 is formed at a right side of the rear side portion 24c of the binding body supporting member 24. The left elongated slot 24j and the right elongated slot 24k form a separated upside down V letter-like shape as in the same manner as the left elongated slot 2e and the right elongated slot 2f of the brush reforming apparatus 1 of the first embodiment. As shown in FIG.6, a left guiding groove portion 24l corresponding to the left elongated slot 2e is formed at an inner side of the left opposing portion 24a, and a right guiding groove portion 24m corresponding to the right elongated slot e is formed at an inner side of the right opposing portion 24b. The binding body 22 is inserted through the left guiding elongated slot 24j, the left guiding groove portion 24l, the right guiding elongated slot 24k and the right guiding groove portion 24m. It is now to be noted that the description of the binding body 22 shall be omitted since the binding body 22 has the same structure as that of the binding body 3 of the brush reforming apparatus 1 of the first embodiment.

In the brush reforming apparatus 20 of the third embodiment, the toothbrush supporting body 21 comprised of the supporting member 23 and the binding body supporting member 24 enables the left protrusion portion 23d to be selectively guided and inserted through the three guide rails 24d, 24e, 24f formed at the left opposing portion 24a of the binding body supporting member 24, and the right protrusion portion 24d to be selectively guided and inserted through the three guide rails 24g, 24h, 24i formed at the right opposing portion 24b of the binding body supporting member 24. With such selective operation, the height of the supporting portion 23a formed at the supporting member 23 and the binding body 22 can be adjusted. Accordingly, in the brush reforming apparatus 20 of the third embodiment, a brush can be bound in correspondence to the toothbrush regardless of the length of the brush formed at the brush portion.

In the brush reforming apparatus 20 of the third embodiment, the position for attaching the supporting member 23 and the binding body supporting member 24 can be variably adjustable (the position of the binding body 22 being vertically adjustable) by forming the protrusion portion 23e, 23d to

the supporting member 23 and forming the guide rails 24d, 24e, 24f, 24g, 24h, 24i to the binding body supporting member 24. Nevertheless, the protrusion portions can be formed to both sides of the supporting member and the guide rails can be formed to the binding body supporting member for other embodiments as well, and the number of the guide rails is not limited to three as in the brush reforming apparatus 20 of the third embodiment, but also can be, for example, two rails, or four or more rails as well.

Next, a fourth embodiment of a brush reforming apparatus 30 for a toothbrush will be explained in detail with reference to the drawings. The brush reforming apparatus 30 of this embodiment is comprised of a support position-adjusting member 31, a binding body supporting member 32, and a binding body 33, as shown in FIG.10. In the brush reforming apparatus 30 of this embodiment, the support position-adjusting member 31 and the binding body supporting member 32 comprise a toothbrush supporting body for this invention. The support position-adjusting member 31 serves to support a bottom surface of a distal end of a toothbrush T (described afterwards), and is molded into a rectangular parallelepiped-like shape, in which three of the guide grooves 31a to 31f are formed on both the left and right side of the support position-adjusting member 31. The binding body supporting member 32 is comprised of a left panel portion 32a, a right panel portion 32b facing the left panel portion 32a, and a binding body supporting portion 32c continuous with an upper edge of the left panel portion 32a and an upper edge of the right panel portion 32b, as shown in FIG.12. A left bent portion 32d for being inserted through one of the three guide grooves 31a, 31b, 31c is formed at a lower end of the left panel portion 32a, and a right bent portion 32e for being inserted through one of the three guide grooves 31d, 31e, 31f is formed at a lower end of the right panel portion 32b. The binding body supporting portion 32c has a plane shape thereof molded into a substantially rectangular C letter shape, a rear side thereof formed with two elongated slots (not shown) for inserting therethrough the binding member 33, and an inner front side thereof formed with a left guiding portion 32f and a right guiding portion 32g in the same manner as that of the toothbrush supporting body 2 comprising the brush reforming apparatus 1 of the first embodiment.

According to the tooth reforming apparatus 30 of the fourth embodiment, since the support position of the support position-adjusting member 31 for the binding body supporting member 32 is adjustable, the tooth reforming apparatus 30 can securely bind a brush of a toothbrush having a high height between a bottom surface of the brush portion and a top end of the brush as well as a brush of a tooth brush having a low height between a bottom surface of the brush portion and a top end of the brush.

In the toothbrush reforming apparatus 30 of the fourth embodiment, the toothbrush supporting body of this invention comprised with the support position-adjusting member 31 and the binding body supporting member 32 is provided as a means to adjust the support position of a brush portion in accordance with the toothbrush to be used. However, a structure of a fifth embodiment shown in FIG.13 (A) can also be chosen as a means for adjusting the support position of a toothbrush according to

circumstance.

That is, a toothbrush reforming apparatus 40 of the fifth embodiment is comprised of a toothbrush supporting body 41, a binding body 42, and a support position-adjusting member 43 for attachment to the toothbrush supporting body 41, as shown in FIG.13 (A). The toothbrush supporting body 41 has a structure substantially the same as that of the toothbrush supporting body 2 comprising the toothbrush reforming apparatus 1 of the first embodiment, and an attachment piece 41b formed at a rear side of a supporting portion 41a and formed slightly lower than a top surface of the supporting portion 41a (the constitutions other than the attachment piece 41b are the same as those of the toothbrush reforming apparatus 1 of the first embodiment). Meanwhile, the support position-adjusting member 43 has a side thereof molded into a rectangular C letter shape, and is comprised of: one supporting surface 43a supporting a brush portion of a toothbrush and serving as a top surface (serving as a bottom surface when turned upside-down as described afterwards) of the support position-adjusting member 43; one supporting panel portions 43b; a downward extending portion 43c extending downward from a proximal end of the one supporting panel portion 43b; and other supporting panel portion 43d formed below the one supporting panel portions 43b, molded with the same width as the one supporting panel portion 43b, and molded with a thickness thinner than that of the one supporting panel portion 43b. An insertion space is formed with a size substantially the same as the thickness of the supporting portion 41a of the toothbrush supporting body 41 and the thickness of the attachment piece 41b, and is formed between the one supporting panel portion 43b and the other supporting panel portion 43d. It is now to be noted that a bottom surface of the other supporting panel portion 43d serves as the other supporting surfaces (numeral abbreviated) when the support position-adjusting member 43 is turned upside-down as described afterwards.

Therefore, according to the toothbrush reforming apparatus 50 of the sixth embodiment, the brush portion of a toothbrush can be supported at the top surface of the one supporting portion 51a to bind the brush of the brush portion at the front side of the endless binding body 52, and the brush portion of a toothbrush can also be supported at the top surface of the other supporting portion 51b to bind the brush of the brush portion at the rear side of the endless binding body 52. Accordingly, the toothbrush reforming apparatus 50 of the sixth embodiment is capable of reforming regardless of the width of the brush portion of the toothbrush since erect portion 2b, 2c as in the toothbrush reforming apparatus of the first embodiment is not formed thereto, and is also capable of reforming a variety of toothbrushes by using the supporting portion 51a when the length (height) of the brush is short and using the other supporting portion 51b when the length (height) of the brush is long. It is now to be noted that the toothbrush reforming apparatus 50 of the sixth embodiment can be applied to a further variety of toothbrushes by using the support position-adjusting member 43. According to the toothbrush reforming apparatus 50 of the sixth embodiment, the toothbrush supporting body 51 has the left elongated slot 51i and the right elongated slot 51j formed thereto, in which the endless binding body 52 is inserted through the left elongated slot 51i and the right elongated slot 51j. However, the toothbrush supporting body 51 can have a left elongated slot 51p and a right elongated slot 51q formed thereto, in which the endless binding body 52 is inserted through the left elongated slot 51p and the right elongated slot 51q. In such case, the left elongated slot 51p and the right elongated slot 51q have a check claw 51r, 51s formed at an upper end of an inner wall thereof for preventing the inserted endless binding body 52 from dislodgement. With such structure, the endless binding body 52 can be engaged with ease.

Next, a seventh embodiment of a brush reforming apparatus 60 for a toothbrush will be explained in detail with reference to the drawings. The brush reforming apparatus 60 of the seventh embodiment is comprised of a binding portion 61 molded into a belt-like shape, a supporting portion 62 for supporting a bottom surface of a brush portion of a toothbrush, and a moving member 63, as shown in FIG.17. The binding portion 61 is a synthetic resin molded into a substantially U letter shape or a V letter shape, and has three recesses 61a, 61b, 61c, 61e, 61f, 61g formed on each opposing side thereof, as shown in FIG.18. The binding portion 61 has an arc-like portion 61h bent into an arc shape at a front side thereof, and is opened at a rear side thereof. The binding portion 61 has a narrow-width portion 61i formed at a midsection thereof for detachment from the moving member 63 (described afterwards).

In the toothbrush reforming apparatus 60, a left supporting portion 64 and a right supporting portion 65 arranged facing the left supporting portion 64 are formed at a midsection proximal to the arc-like portion 61h of the binding portion 61. Further, in the toothbrush reforming apparatus 60, the left supporting portion 64 and the right supporting portion 65 forms the supporting portion 62. The left supporting portion 64 is comprised of a left downward extending portion 64a having a top end thereof extending downward from a bottom surface of the midsection of the binding portion 61, and a left supporting panel portion 64b bent substantially perpendicular to a bottom end of the left downward

extending portion 64a for supporting the brush portion. The right supporting portion 65 is formed symmetrically to the left supporting portion, and is comprised of a right downward extending portion 65a having a top end thereof extending downward from a bottom surface of the midsection of the binding portion 61, and a right supporting panel portion 65b bent substantially perpendicular to a bottom end of the right downward extending portion 65a for supporting the brush portion. It is now to be noted that a tip of the left supporting panel portion 64b and a tip of the right supporting panel portion 65b are slightly spaced to enable widening in a left-right direction in correspondence to widening of the opposing midsection of the binding body 61.

As shown in FIG.19, the moving member 63 is molded into a planar shape, and has an elongated slot 63a for insertion of one side of the binding body 61 at a left side thereof, and a groove portion 63b with an opening (numeral abbreviated) having a width substantially the same as that of the narrow-width portion 61i of the binding body 61 at a right side thereof. It is now to be noted that the length of both the elongated slot 63a and the groove portion 63b correspond to the width of the binding portion 61, and an inner wall of the elongated slot 63a and the groove portion 63b are formed with protrusions 63c, 63d, 63e, 63f, 63g, 63h for insertion to the three recesses 61a, 61b, 61c, 61e, 61f, 61g of the binding body 61. The moving member 63 has a front surface formed with an arc-like recessed groove 63i.

Consequently, according to the toothbrush reforming apparatus 60 of the seventh embodiment, first, one side of the binding body 61, which is bent at the center, that is, at the arc-like portion 61h and has a midsection facing each other, is detached from the groove portion 63b formed in the moving member 63; both ends of the binding body 61 is slightly widened; then maintaining such state, the distal end of a brush portion of a toothbrush is supported upon the supporting portion 62 comprised of the left supporting portion 64 and the right supporting portion 65 so as to place the brush of the brush portion into the binding portion 61. Subsequently, the one side of the binding body 61 detached from the moving member 63 is reattached in a manner shown in FIG.17, and then, the moving member 63 is moved in a direction to the front side. Accordingly, the brush can be bound by the binding body 61 and the moving member 63. Therefore, the toothbrush reforming apparatus 60 having the foregoing structure can also easily bind a brush of a toothbrush.

Although the toothbrush reforming apparatus 60 of the seventh embodiment has been described with having the supporting portion 62 formed only at the front side of the binding portion 61 for supporting the brush portion of the toothbrush, the supporting portion of this invention is not to be restricted to be singularly formed, but could also be formed as two supporting portions, as a toothbrush reforming apparatus 70 of an eighth embodiment shown in FIG.20. That is, the toothbrush reforming apparatus 70 of the eighth embodiment is comprised of a belt-like binding portion 71 molded into a belt-like shape, bent at a center, that is, at an arc-like portion 71a of a rear side to become shaped into a substantially U letter or V letter form, and formed with both ends thereof positioned at a front side; a first

supporting portion 72 formed at a midsection of the binding portion 71 on the front side; a second supporting portion 73 formed at the midsection on the rear side; and a moving member 74. In the binding portion 71, a narrow-width portion 71b is formed at a midsection on the rear side as in the toothbrush reforming apparatus 6 of the seventh embodiment; a midsection of one end of the binding portion 71 is molded into an arc shape; and a protrusion 71c is formed on the one end thereof. In the same manner, a midsection of the other end of the binding portion 71 is molded into an arc shape, and a recess 71d is formed on the other end thereof for insertion with the protrusion 71c. As shown in FIG.21, the first supporting portion 72 is comprised of a left supporting portion 75 and a right supporting portion 76 in the same manner as the supporting portion 62 of the seventh embodiment, and the second supporting portion 73 is comprised of a left supporting portion 77 and a right supporting portion 78, as shown in FIG.23. It is now to be noted that a detail description of the first supporting portion 72 and the second supporting portion 73 shall be omitted since the first supporting portion 72 and the second supporting portion 73 have a structure basically the same as that of the supporting portion 62 of the toothbrush reforming apparatus 60 in the seventh embodiment. However, in the toothbrush reforming apparatus 70 of the eighth embodiment, the position of the top surfaces (supporting position for the brush portion) of the left and right supporting panel portions 75a, 76a of the first supporting portion 72 are formed lower than the top surfaces of the left and right supporting panel portions 77a, 78a of the second supporting portion 73, as shown in FIG.20.

As shown in FIG.23, the moving member 74 is molded into a substantially planar shape, and has an left groove portion 74a for insertion of one side of the binding body 71 at a left side thereof, and a groove portion 74b with an opening (numeral abbreviated) having a width substantially the same as that of the narrow-width portion 71b of the binding body 71 at a right side thereof. It is now to be noted that the left groove portion 74a has an opening formed at a lower portion thereof, and a check claw formed at bottom edge of the inner wall thereof. Further, the moving member 74 has a front recessed groove 74d formed extending from top to bottom at the front of the moving member 74, and a rear recessed groove 74a formed at the rear of the moving member 74.

Consequently, according to the toothbrush reforming apparatus 70 of the eighth embodiment, the midsection of the binding body 71 is detached from the moving member 74 through the narrow-width portion 71b; the brush portion is then inserted either from the front side [when reforming a long (tall) brush B1] or the rear side [when reforming a short (short) brush B1] in state a where the front side is open, as shown in FIG.24; the midsection of the binding body 71 is then inserted again through the right groove portion 74b of the moving member 74; and the moving member 74 is then moved either toward the front side or the rear side so that each of the brushes B1 of the brush portions B of the toothbrushes can be bound. That is, the toothbrush reforming apparatus 70 of the eighth embodiment can also provide secure binding with a single toothbrush reforming apparatus 70 for a toothbrush T having a long brush B1 as well as a tooth brush T having a short brush B1 (e.g. an electric toothbrush).

Next, a ninth embodiment of a brush reforming apparatus 80 for a toothbrush will be explained in detail with reference to the drawings. The toothbrush reforming apparatus 80 of the ninth embodiment is comprised of a toothbrush supporting body 81 having a plane shape molded into a V letter form, and a binding body 82 molded into a belt-like shape, as shown in FIG.25. The toothbrush supporting body 81 has a front side being in an open state and being molded with a plane shape of a V letter shape, in which the lower portion of the toothbrush supporting body 81 includes a left supporting portion 81a for supporting substantially the left half of a bottom surface of a brush portion of a toothbrush when the front side is in a closed state (as described afterwards), a right supporting portion 81b for supporting substantially the right half of a bottom surface of the brush portion when the front side is in a closed state, a left erect portion 81c erected upward from a left end of the left supporting portion 81a, a right erect portion 81d erected upward from a right end of the right supporting portion 81b, a left binding body supporting portion 81e formed at a top end of the left erect portion 81c for supporting a midsection of the binding body 82, and a right binding body supporting portion 81f formed at a top end of the right erect portion 81d for supporting a midsection of the binding body 82.

A left guiding elongated slot 81g is formed at a front side of the left binding body supporting portion 81e for inserting the binding body 82 therethrough, and a right guiding elongated slot 81h is formed at a front side of the right binding body supporting portion 81f for inserting the binding body 82 therethrough. A left groove portion 81i is formed at an inner surface of the left binding body supporting portion 81e for guiding the binding body 82, and a right groove portion 81j is formed at an inner surface of the right binding body supporting portion 81f for guiding the binding body 82. Further, one engagement portion 81k is formed at a front surface of the left binding body supporting portion 81e, and the other engagement portion 81l is formed at a front surface of the right binding body supporting portion 81f for engaging with the one engagement portion 81k. Accordingly, the toothbrush supporting body 81, which had been in an opened state and in a substantially V letter shape, is closed by engaging the one engagement portion 81k to the other engagement portion 81l. When the front side of the toothbrush supporting body 81 is in an opened state, the binding body 82 is correspondingly opened and molded into a substantially V letter shape, has a center bent into a arc-like shape, has a midsection of one end inserted through the left elongated slot 81g and along through the left groove portion 81i, and has a midsection of the other end inserted through the right elongated slot 81h and along through the right groove portion 81j. It is now to be noted that both ends of the binding body 82 are free ends without being fixed by a metal fitting 4 as in the binding body 3 of the toothbrush reforming apparatus 1 in the first embodiment.

According to the toothbrush reforming apparatus 80 of the ninth embodiment, a brush portion B of a toothbrush T is inserted from a front side in a state where the front side is opened, and the one engagement portion 81k and the other engagement portion 81l are then engaged to each other for closing the front side of the toothbrush reforming apparatus 80. Accordingly, the brush portion B of the toothbrush T is supported by the left supporting body 81a and the right supporting body 81b. In such

state, the brush is gradually bound at the center of the binding body 82 (portion bent in a arc-like shape) by drawing forth both ends of the binding body 82. The brush can be completely bound when the binding body 82 is drawn forth to a prescribed length. Therefore, the toothbrush reforming apparatus 80 having the foregoing structure can also easily and securely bind a brush B1 of a toothbrush.

Next, a tenth embodiment of a brush reforming apparatus 90 for a toothbrush will be explained in detail with reference to the drawings. The toothbrush reforming apparatus 90 of the tenth embodiment has a characteristic of having a single guiding elongated slot (described afterwards) formed to a toothbrush supporting body 91. That is, the toothbrush reforming apparatus 90 is comprised of the toothbrush supporting body 91 and a belt-like binding body 92, as shown in FIG.27. As the toothbrush reforming apparatus 10 of the second embodiment as shown in FIG.5, the toothbrush supporting body 91 is comprised of a supporting portion 91a for supporting a brush portion of a toothbrush, a rear side erect portion 91b erect upward from the rear side of the supporting portion 91a, and a binding body supporting portion 91c formed at a top end of the rear side erect portion 91b. However, as shown in FIG.28, the binding body supporting portion 91c has a single guiding elongated slot being formed thereto and has two stoppers 93, 94 fixed thereto, in which the stoppers 93, 94 are molded into a rod-like shape for preventing the brush from being caught in the binding body 92 (described afterwards). The stoppers 93, 94 are inserted through insertion apertures 91e, 91f, 91g, 91h formed on both side surfaces of the toothbrush supporting body 91. It is now to be noted that the binding body 92 of the toothbrush supporting body 91 also has guiding groove portions 91i, 91j formed thereto, as the toothbrush reforming apparatus 10 of the second embodiment. The binding body 92 is structured basically the same as the binding body 3 of the toothbrush reforming apparatus 10 of the second embodiment except for including elongated slots 92a, 92b, 92c, 92d formed from the bent, arc-like shaped distal end to the proximal end for insertion of the two stoppers 93, 94.

In the same manner as the toothbrush reforming apparatus (numeral abbreviated) of each of the aforementioned embodiments, the toothbrush reforming apparatus 90 of the tenth embodiment having a single guiding elongated slot 91d formed thereto can also provide easy and quick binding of a brush of a brush portion. Further, with the toothbrush reforming apparatus 90, the two stoppers 93, 94 can effectively prevent the bristles of the brush from being caught between the binding body 92 and the binding body 92 when the brush of the brush portion is bound by pulling the binding body 92. It is now to be noted that the stoppers 93, 94 are not necessarily required to be dually arranged to the toothbrush supporting body, and that a single stopper (not shown) can also be arranged thereto.

Consequently, the toothbrush reforming apparatus (numeral abbreviated) of the aforementioned embodiments can provide extremely easy and secure binding of a brush B1 formed at a brush portion B of a toothbrush T. More particularly, each of the toothbrush reforming apparatuses (numeral abbreviated) can provide reformation regardless of the length of the targeted brush portion B and can also easily reform the electric toothbrush used in recent years with a plane shape of a circular shape owing to the

structure thereof using a movable binding body, an endless binding body, or a moving member.

Although the portions in the above description for each of the embodiments formed at the toothbrush supporting body for inserting the binding body or the endless binding body therethrough are all formed as the elongated slot and the groove portion, it is possible for this invention to have at least one of either the elongated slot or the groove portion. Although a single elongated slot 91d (see FIG.28) is formed in the toothbrush supporting body 91 for inserting the binding body 92 therethrough in respect of the toothbrush reforming apparatus 90 of the tenth embodiment, such portion for insertion of the binding body 92 is not necessarily required to be formed as the elongated slot 91d, but can also be a groove portion formed extending from top to bottom thereof. Likewise, the elongated slot (numeral abbreviated) comprising the toothbrush reforming apparatus 1, 10, 20, 30, 40 of the first, second, third, and fourth embodiment can instead be altered to a groove portion formed extending from top to bottom of each binding body supporting portion (numeral abbreviated). A binding body or an endless binding body can easily be attached to a toothbrush supporting body by altering to such groove portion.

INDUSTRIAL APPLICABILITY

As apparent from the above description of each embodiment of this invention, according to the first invention (invention described in claim 1), a distal end of a toothbrush is supported by a supporting portion formed to a toothbrush supporting body, and a binding body is moved in a direction toward the distal end of the toothbrush or in a direction opposite from the distal end of the toothbrush, thereby, a brush portion of a toothbrush is bound by the binding body. Accordingly, the first invention can bind a brush with extreme ease and quickness, and can provide binding whether a brush portion of a toothbrush is long or short. In a state where a brush is bound by the toothbrush reforming apparatus, a method, for example, in which the toothbrush reforming apparatus is applied with boiled water or steeped into hot water, and then cooled by cold water or the like, can reform the brush into an ideal state.

According to the second invention (invention described in claim 2), a toothbrush supporting body is formed with one supporting portion for supporting a distal end of a toothbrush and another supporting portion also for supporting the distal end of the toothbrush, the one supporting portion and the other supporting portion are formed different in terms of the height for providing support, and a belt-like endless binding body is provided as a component of the invention, thereby, the second invention is not only able to reform a brush portion of various length as in the first invention, but is also able to reform a brush portion having a brush (bristles) of various height, in which the distal end of a toothbrush is supported by selecting either the one supporting portion or the other supporting portion for providing secure reformation. It is now to be noted that a brush for an electric toothbrush can also be reformed by forming the height of the one supporting portion or the other supporting portion in correspondence with the length of the brush of the electric toothbrush.

According to the third invention (invention described in claim 3), a toothbrush supporting body,